

# A new species of *Parvaplustrum* Powell, 1951 (Gastropoda: Heterobranchia: Aplustridae) from the northeastern Pacific

Ángel Valdés

Department of Biological Sciences  
California State Polytechnic University  
3801 West Temple Avenue  
Pomona, CA 91768 USA

Terrence M. Gosliner

Department of Invertebrate Zoology and Geology  
California Academy of Sciences  
55 Music Concourse Drive, Golden Gate Park  
San Francisco, CA 94118 USA

Anders Warén

Department of Invertebrate Zoology  
Swedish Museum of Natural History  
Frescativägen 40, Frescati  
SE-11418 Stockholm, Sweden

## ABSTRACT

A new species of *Parvaplustrum* from the northeastern Pacific, recognized in the literature as undescribed, is formally named herein. This new species is morphologically distinct from the two other species in the genus, *Parvaplustrum tenerum* and *P. japonicum*, and distinguishable by its shell sculpture. The new species is found from Oregon to Baja California, typically associated with chemosynthetic deep-water environments and organic-rich sediments.

*Additional Keywords:* taxonomy, systematics, shell morphology, chemosynthetic environments

**Type Species:** *Parvaplustrum tenerum* Powell, 1951. Falkland Islands, by original designation.

**Diagnosis:** Shell ovate, globose; sculpture of extremely fine and dense spiral striations. Body with two extensible appendages on each side of headshield; operculum absent; radula with single petaliform lateral tooth in each row, gizzard lacking plates.

## *Parvaplustrum cadieni* new species

(Figures 1–6)

*Parvaplustrum* sp. A. Cadien, 1995: [pages unnumbered].  
*Parvaplustrum* sp. Gosliner, 1996: 173, figs. 2.2C–D  
[as *Parvamplustrum*].

**Description:** Shell to 2 mm, thin, pyriform (Figure 1). Body whorl slender to very rotund, spire involute, posterior margin of outer forming raised lip. Aperture wide, narrowing slightly mid-length. Sculpture typically absent, with very fine spiral lines of punctuations in larger individuals. Shell color transparent to translucent white. Protoconch located apically on the teleconch, with 1.5 whorls (Figure 6). Animal not examined alive. Preserved specimens with a bifid posterior appendage on each side of headshield (Figure 2). Posterior end of body forming well defined posterior end. Gill plume unipinnate (Figure 3), located above head (Figure 4). Penis elongate, simple. Radula with a single row of petaliform lateral teeth on each side (Figure 5). No jaws were observed.

**Type Material:** Holotype LACM 3329, 390 m. R/V VELERO IV, 17 February 1976, 1 shell specimen, 2.3 mm, from type locality; Paratype CASIZ 216674, off Point Arguello, California, 345 m depth, Santa Barbara Channel Project, Phase I Reconnaissance (Stn. 61), 1 specimen; Paratype SMNH 44660, Hydrate Ridge, off Oregon (44°34' N, 125°08' W), 770 m depth, 1999, R/V SONNE Cruise 143 (MUC), 2 specimens.

## INTRODUCTION

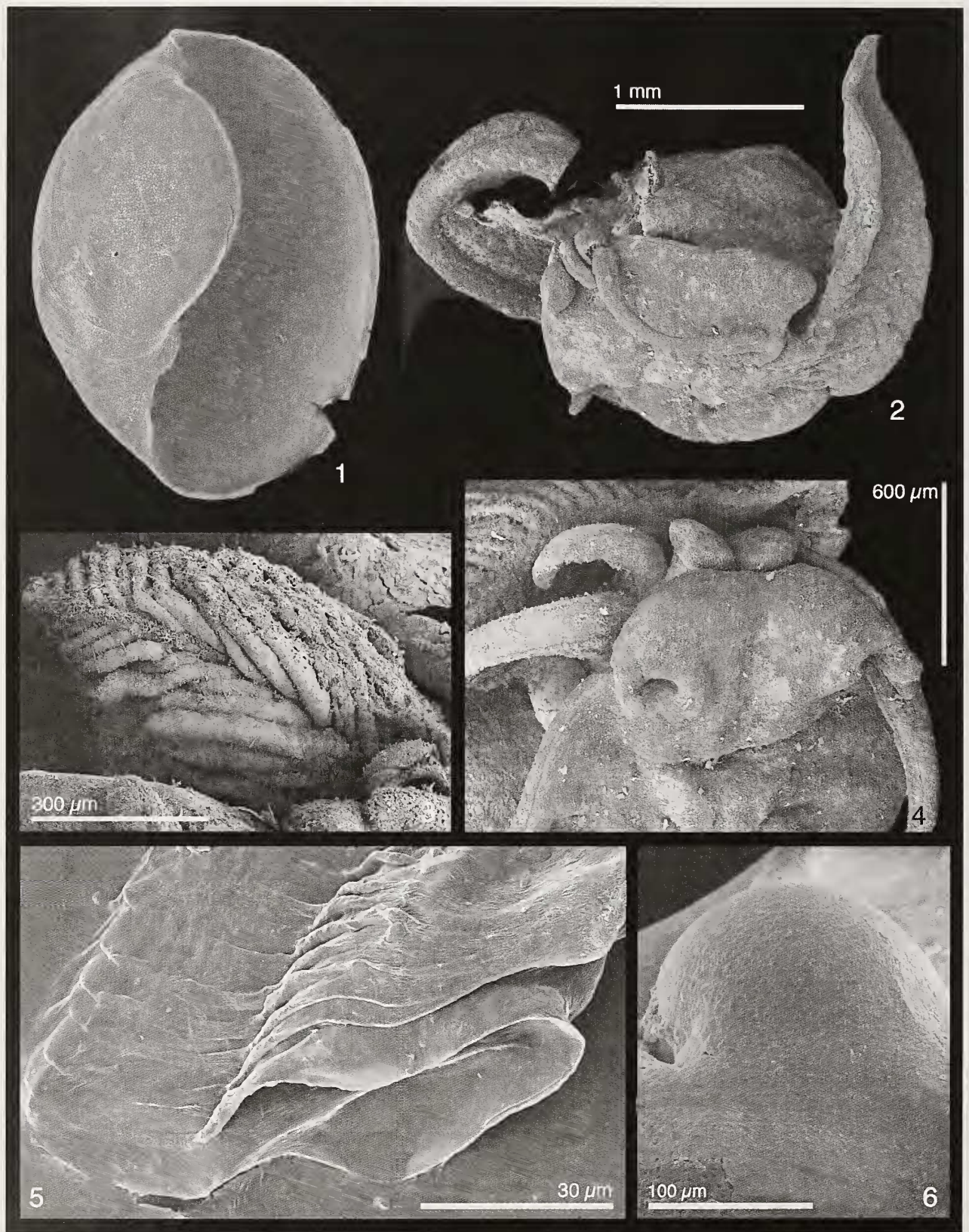
*Parvaplustrum* Powell, 1951 is a temperate to cold-water genus of aplustrid heterobranch sea slugs. Only two species have been described to date, *Parvaplustrum tenerum* Powell, 1951, from the Falkland Islands, and *Parvaplustrum japonicum* Chaban and Chernyshev, 2013, from the Sea of Japan. A third species from the northeastern Pacific has been cited and discussed in the literature (Cadien, 1995a; Gosliner, 1996; Chaban and Chernyshev, 2013) but never formally named.

In this paper we provide a formal description of this species based on specimens collected from California and Oregon. All the specimens are deposited at the Natural History Museum of Los Angeles County (LACM), the Swedish Museum of Natural History (SMNH), the Department of Invertebrate Zoology and Geology at the California Academy of Sciences (CASIZ) and the Scripps Institution of Oceanography Benthic Invertebrate Collection (SIO).

Family Aplustridae Gray, 1847

## Genus *Parvaplustrum* Powell, 1951

*Parvaplustrum* Powell, 1951: 180.



**Figures 1–6.** *Parvapustrum cadieni* new species, scanning electron micrographs. **1.** Holotype, 2.1 mm (LACM 3329), off Tanner Bank, California, photo A. Valdés. **2–4.** Details of the external anatomy of a specimen from Oregon (SMNH 44660). **2.** Ventral view. **3.** Gill. **4.** Head (3–4, photos A. Warén). **5.** Radular teeth of a specimen from Oregon (SMNH 44660), photo A. Warén. **6.** Protoconch of a specimen from NW of San Nicolas Island, California (LACM 1995-181), photo A. Valdés.

**Type Locality:** Off Tanner Bank, California (32°40.97' N, 119°14.04' W) (R/V *Velero IV*, 17 February 1976).

**Other Material Examined:** SMNH 44675, Hydrate Ridge, off Oregon (44°34.20' N, 125°08.83' W), 777 m depth, 11 Aug 1999, R/V *SONNE* Cruise 148 (MUC90D), 8 specimens; SMNH 45424, subduction zone off the Oregon coast (44°34.19' N, 125°08.82' W), 787 m depth, R/V *SONNE* Cruise 143, 5 specimens; SMNH 45428, subduction zone off the Oregon coast (44°34.20' N, 125°08.81' W), 786 m depth, R/V *SONNE* Cruise 143, 2 specimens; SMNH 111716, Hydrate Ridge, off Oregon (44°34.255' N, 125°09.289' W), 809 m depth, DSV *ALVIN* dive 4629, 1 specimen; SMNH 111919, Hydrate Ridge, Off Oregon (44°34.118' N, 125°09.076' W), 795 m, DSV *ALVIN* dive 4635, 1 specimen; Hydrate Ridge, off Oregon (44°40.173' N, 125°05.899' W), 618 m depth, DSV *ALVIN* dive 4631, 1 specimen; SIO, Hydrate Ridge, off Oregon (44°40.202' N, 125°05.876' W), 603 m, DSV *ALVIN* dive 4632, 1 specimen; LACM 1995-181, on a whale skeleton, northwest of San Nicolas Island, California (33°20.35' N, 119°58.85' W), 960 m depth, 30 Apr 1995, 6 specimens; LACM 152825, on a whale skeleton, Santa Catalina Basin, California (33°11.72' N, 118°29.49' W), 1240 m depth, 14 Oct 1999, DSV *ALVIN* dive 3482, 1 specimen.

**Geographic Range:** Oregon, possibly from Puget Sound to Bahía Todos los Santos, Baja California (D. Cadien, pers. comm.); 3–809 m.

**Biology:** Found in chemosynthetic deep-water environments such as cold seeps and whale falls (present paper) as well as organic-rich shelf sediments and deeper portions of bays (D. Cadien, pers. comm.). Specimens as small as 1.1 mm show mature reproductive cells on sectioning, and are assumed reproductively mature (Cadien, 1995).

**Etymology:** Named in honor of our friend and colleague Don Cadien, who first recognized this species as undescribed.

## DISCUSSION

Although tentatively assigned to the family Aplustridae (=Hydatinidae) by Cadien (1995), Gosliner (1996) and Chaban and Chernyshev (2013), the actual phylogenetic position of *Parvaplustrum* remains unknown. Powell (1951) and Marcus and Marcus (1969) suggested that a new family might be needed for this group. Because of the low diversity in *Parvaplustrum* and rarity of all three species, no material available for molecular work has been studied to date. Until such material becomes available, relationships among the species and placement of the genus remain tentative. *Parvaplustrum cadieni* new species is here assigned to *Parvaplustrum* based on

the presence of the diagnostic features listed by Chaban and Chernyshev (2013), including an ovate-globose *Haminoea*-like shell without operculum, two extensible appendages on each side of the head shield, radula with a pair of petaliform lateral teeth in a row, and the presence of jaws but not gizzard plates.

As already discussed by Chaban and Chernyshev (2013), *Parvaplustrum cadieni* new species is clearly distinct from the two other known species of *Parvaplustrum*, and the main differences are found in the shell morphology. *Parvaplustrum tenerum* has extremely fine and dense spiral striations, whereas *P. japonicum* has irregularly arranged, numerous, and extremely small pits and *P. cadieni* has spiral lines of punctae. There is also considerable disparity in radular tooth structure among the type species, *P. tenerum*, which has hook-shaped teeth apices (Marcus and Marcus 1969), and the two taxa from the North Pacific, with rounded apices.

A fourth possible species, described as *Meloscaphtander* sp. A by Cadien (1995b) has a more globose shell than *P. cadieni*, and is very similar to *P. japonicum*. This undescribed species is typically found in shallower waters, 30–605 m, from Goleta to San Diego, California.

## ACKNOWLEDGMENTS

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